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SPEECH ACTIVATED TELEPHONE DEVICE FOR CONNECTION TO EXISTING
LANDLINE PHONE

Inventors: Joseph R. Petrella, Jr.

Thomas S. Krol

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Assignee: IMET CORPORATION

This application is a continuation-in-part of copending U.S. application serial number 09/765,859, filed on January 19, 2001, entitled "SPEECH ACTIVATED TELEPHONE DEVICE FOR CONNECTION TO EXISTING TELEPHONE".

Kenneth P. Glynn
Attorney for Applicant
Reg. No. 26,893
24 Mine Street
Flemington, NJ 08822

Tele: (908) 788-0077
Fax: (908) 788-3999

007031704hub/ml

SPEECH ACTIVATED TELEPHONE DEVICE FOR CONNECTION
TO EXISTING LANDLINE PHONE

(Attorney Docket No. IME-104C)

REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of copending U.S. application serial number 09/765,859, filed on January 19, 2001, entitled "SPEECH ACTIVATED TELEPHONE DEVICE FOR CONNECTION TO EXISTING TELEPHONE".

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to voice activated, voice operated telephone devices specifically fitted to existing landline telephones, as well as the combination of both the device and a landline phone. It enables a user, such as someone who is incapacitated or cannot utilize normal hand functions, to both turn on (activate) and to operate the device and phone, in a completely hands free manner. The device will guide a first user through initial training to input key words for future directions that are completely given to the device by a second user. The first user (training input person) and the subsequent, second user may be different persons, or with some initial assistance, the first and second user may be the same person. This invention eliminates the need for complex systems with computers to retrofit existing landline phones.

2. Information Disclosure Statement

The following patents are representative of various types of voice activated telephone dialing systems:

5 U.S. patent number 4,945,557 describes an automatic dialing apparatus for use in a telephone or facsimile machine which sends out a dial signal to an external network automatically. A detachable telephone number memory, which
10 stores a telephone number together with an area code, is detachably mounted on a telephone unit which includes a memory storing and area code of the district in which the telephone unit is located. The area code of the telephone number
15 data supplied from the telephone number memory is deleted if that area code agrees with the area

code stored in the memory of the telephone unit.

An automatic dialing apparatus is preferably constructed to carry out dialing automatically responsive to a voice. In the preferred

5 embodiment of such a voice activated dialing apparatus, a telephone number is input through a keyboard and a corresponding identifier, typically the name of a subscriber, is voiced and its voice signal is stored in association with
10 the telephone number.

U.S. patent number 5,007,081 describes a speech activated telephone that is disclosed. The speech activated phone stores a plurality of spoken words, the telephone number and the
15 alphanumeric word associated with the spoken word. The telephone automatically dials the

telephone number in response to inputted spoken word, matching the stored spoken word. In addition, the telephone number and alphanumeric text for the matched spoken word is displayed.

5 U.S. patent number 5,148,471 sets forth a portable radiotelephone with an integral voice recognition circuit which is disclosed. Control of the voice recognition circuit is achieved with a foldable housing element which, in a closed position, covers an external keypad and control buttons. When the foldable housing element is in an open position, the portable radiotelephone is placed in an off-hook condition, the voice recognition circuit is activated, and the acoustic transducers are coupled to the voice recognition circuit. When the foldable element

10

15

is in a closed position, the portable
radiotelephone is placed in an on-hook condition,
the voice recognition circuit is deactivated, and
the electroacoustic transducers are coupled to
5 the radiotelephone. A rapid closing and opening
of the foldable element results in the voice
recognition circuit being deactivated while the
portable radiotelephone remains in the off-hook
condition.

10 U.S. patent number 5,369,685 describes a
voice activated telephone directory and call
placement system accessible over a
telecommunications network which allows a caller
to store a personalized telephone directory, and
15 to retrieve a selected directory listing
therefrom by speaking a series of voice entries.

In response, the system selectively provides a voice rendition of a destination telephone number associated with the listing and optionally initiates dialing of the number.

5 U.S. patent number 5,452,340 describes the present invention which relates to a method of interface between a voice activated dialing system and a user. The present invention solves the problems presented by the prior art by

10 providing a user interface which can add a name and corresponding telephone number to a directory during the process of initiating a telephone call. In addition, the present invention

15 provides the user the opportunity to select which element of a directory listing should be changed, using a single integrated review, erase and

change functionality accessible while in a
directory mode.

U.S. patent number 5,717,738 describes a
voice recognition telephone system (10) which
5 allows a user to generate a plurality of
directions (76). Each directory has a
corresponding entry list containing a plurality
of entry names and corresponding phone numbers.

The user can add (172) or remove (170) entry
10 names as desired. The user can enter phone
numbers (192) for each entry name and modify
phone numbers as desired. The user can also
place a call (158) through a generated entry
name.

15 U.S. patent number 5,991,364 describes a
telephone communications system Advanced

Intelligent Network (AIN) platform which provides
a voice activated call dialing functionality
through speaker independent phoneme speech
recognition that have a minimum volume of storage
5 without requiring user template training.

Speaker independent phoneme recognition
identifies phoneme strings of caller spoken
utterances which are then compared to phoneme
string representations that previously have been
10 stored in respective caller processing records
(CPRs) for those subscribers listed in the ISCP
database, or stored in an equivalent peripheral
database with which the ISCP can communicate.

Each stored phoneme string representation is
15 associated in the CPR with a destination
telephone number that may then be extracted to

route a call.

Notwithstanding the prior art, the present invention is neither taught nor rendered obvious thereby.

5

SUMMARY OF THE INVENTION

10

The present invention is a speech activated device for attachment to an existing telephone, for hands-free dialing. This may be used in the present invention in any telephone with a preprogrammable one touch dialing feature.

15

One critical aspect of the present invention device is that it converts the one touch dialing of a conventional telephone to voice activated dialing. It receives and recognizes the voice, converting from audio to analog signals which are sent to the telephone to

activate the buttons hands-free. This feature is
also the basis for activating not only the one
touch dialing feature, but also other button-
activated features, such as mute, speakerphone,
5 redial, and any other button-activated phone
feature.

Thus, the present invention device includes
a main housing, containing:

a telephone control circuit for analog
10 input to a telephone with a one touch dialing
feature to induce dialing of a telephone number
selected from a preloaded directory;

an encoder circuit connected to the
telephone control circuit for sending digital
15 signals thereto and connected to a speech
recognition module for receiving signals

therefrom and converting digital signals from the module into recognizable digital signals to control the telephone control circuit which selects the button-based functions of the telephone, including the aforesaid one touch dialing; and,

a speech recognition module contained within the main housing which includes a processor for driving the other functions therein. The speech recognition module is connected to the encoder circuit and to a microphone and speaker for receiving speech inputs and transmitting audio outputs.

There is a power source and a power source connection into the main housing, to at least one of the telephone control circuit, the encoder

circuit and the speech recognition module for
powering the device. In some embodiments, the
power source connection is connected to one of
the above components and that in turn is
5 connected to one or more of the other components.
In the most preferred embodiment, the power
source connection is to all three of these
components. This power source connection may be
directly connected to the above device circuits
10 or may be indirectly connected, e.g. via a
voltage regulation circuit.

A telephone connecting means is connected
to the telephone control circuit for connection
to a telephone.

15 The power source may be any workable power
source, and will in most instances, require

current conversion and voltage regulation (e. g.
for standard AC residential power). Thus, the
present invention will include voltage regulation
where necessary. The preferred voltage regulation
5 circuit with voltage regulator will be connected
to the telephone control circuit, the encoder
circuit and the speech recognition module, as
well as at least one external speaker, via the
power source connection. The voltage regulation
10 circuit may be included within the main housing
or external therefrom, but is preferably included
in the main housing.

In other embodiments, the present invention
includes the telephone in combination with the
15 aforesaid device.

Also, in some preferred embodiments, the

device speech recognition module includes both visible and audible feedback hardware and/or software.

5 The device may also include at least one battery connected to the power source connection. In some instances, an optional rechargeable backup battery and charger circuit may be included.

10 The telephone connecting means utilized in the present invention device is preferably a ribbon cable or group of wires which includes connection to the contact points of a plurality of name/telephone number buttons of a conventional telephone's one touch dialing unit, as well as connection to other desired features, 15 such as redial, mute, volume control, speaker

phone, etc.

Optionally, the present invention device may further include training instructions for a user.

Also, the present invention may include a

5 prompting program to prompt a user to serially

input a plurality of names and corresponding

phone numbers for future recall by name for

automatic dialing of the corresponding number.

There may be a training button for initiating the

10 training instructions, or a training recording

could be initiated by voice activation, such as

by saying TRAIN ME.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention should be more fully

15 understood when the specification herein is taken

in conjunction with the drawings appended hereto

wherein:

Figure 1 illustrates a block diagram of one arrangement of a present invention device;

5 Figure 2 shows a symbolic wiring diagram for critical features of a present invention device with phone; and,

Figure 3 illustrates a top view of a present invention device and phone and Figure 4 illustrates a side view thereof.

10

DETAILED DESCRIPTION OF THE PRESENT INVENTION

The present invention is directed to a device for attachment to a telephone with a one touch dialing feature, as described above.

15 Details of some preferred embodiments are illustrated in Figure 1 in block form.

Referring to Figure 1, there is shown a telephone 150 which is an existing telephone with a preprogrammable one touch dialing feature. In some embodiments, the present invention is a device such as device 100 and, in other embodiments, the present invention is a device and a telephone, such as telephone 150 in combination.

Device 100 includes a speech recognition module 101, which optionally includes both audible and visible feedback, and minimally includes visible feedback.

Speech recognition module 101 is connected to an external microphone 103 and is also connected to external speaker 109. Speaker 109 could be built-in, but is preferably an external

speaker with volume control, and preferably,
volume control from the speech recognition
module. Voltage regulation circuit 111 is
connected to AC adaptor 113, providing power to
5 device 100. Voltage regulation circuit 111 is
connected to the speech recognition module 101
and the other circuits, as shown.

Speech recognition module 101 may be an off-
the-shelf unit, such as "Voice Direct 364",
10 manufactured by Sensory, Inc. of Sunnyvale, CA.
Such units have sufficient voice recognition
capability to easily support a name-based
telephone directory of ten to twenty-five or more
entries. Such units include a processor with
15 sufficient capabilities to control other
necessary functions of the device. The details

of the functionality of the present invention will be more clearly understood in relationship to the detailed example set forth below.

Speech recognition module 101 converts
5 incoming audio signals to digital signals which are recognized by encoder circuit 105 for conversion to control signals to the telephone control circuit. Telephone control circuit 107 sends analog signals to the contact points
10 mentioned above, imitating the depression of a button to complete a circuit and initiate a function, such as a hands-free dial up.

Figure 2 illustrates a more specific embodiment of the present invention. As with
15 Figure 1 above, this example shown in block form is representative of preferred embodiments of the

invention, and numerous variations, wiring rearrangements and substitutions may be made without exceeding the scope of invention. In Figure 2, existing telephone 151 is shown, and

5

this would include a one touch dialing feature with a programmable directory. The present invention device includes the speech recognition

module 153 as its core component, and in this case, "Voice Direct 364" described above. Module

10

153 is connected to external microphone 155, such as a clip-on microphone, and to external speaker 157.

15

Module 153 is connected to encoder circuit 159 via an eight wire ribbon to convert the eight outputs from module 153 into fifteen distinct signals for controlling the telephone push button

features for hands-free activation. These fifteen
signals are sent to telephone control circuit
161, which contains analog multiplexers and/or
relays to simulate the action of pressing the
existing telephone buttons manually. It also
disables multiplexers during power up.

Telephone control circuit 161 is connected
to existing telephone 151 via the connections
shown, which connections have the functions
designated in the drawing. In the existing
telephone one touch dialing feature, phone
numbers are stored therein and the inputs from
telephone control circuit 161 correspond thereto.
Some of the wiring between various components may
have plural connections in the interest of
economy and efficiency. For example, some of the

wires from the telephone control circuit 161 to
existing telephone 151 are common among the
different buttons on the phone. These common
connections need to be brought to the existing
telephone once.

Voltage regulation circuit 163 is connected
to the other main components, as shown, to
provide a 5V DC source to the components. It also
has optional AC adaptor 165, with 120V AC to 12V
DC conversion, battery backup 167 and charger and
rechargeable battery backup 169.

In summary, the embodiment of Figure 2
operates to provide hands-free dialing and other
operations to users who are handicapped or
otherwise desire hands-free telephonic
operations. It receives, controls and responds to

the following voice commands: (a) the dialing of
up to ten numbers; (b) speaker phone; (c) mute;
(d) redial; (e) flash (call waiting); and audible
and visible feedback on word recognition. It will
5 also provide battery backup control and power
trouble signaling.

Referring to Figure 3, there is shown a top
view of a telephone 150 with a present invention
device 100, and these are also shown in a side,
10 oblique view in Figure 4. Telephone 150 includes
a hand set microphone speaker 153 and a cover 155
with conventional one touch dialing buttons 159.

Figure 3 shows various connections for
device 100: the speech recognition unit 101 of
15 Figure 1, the encoder circuit of 105 of Figure 1
and the telephone control circuit 107 of Figure

1. External connections include a microphone
plug 205, a speaker plug 207 and a speaker power
connection 209. Also shown on top 201 of device
100 is an optional switch 211 for utilizing a
5 speaker only mode or a speaker plus buzzer mode.
A power source connection 203 could be connected
to an external transformer plugged into a common
household outlet for receiving 120 volts AC and
for sending 12 volts DC to the voltage regulation
10 circuit, which sends regulated 5 volts DC to the
other circuits within device 100. The voltage
regulation circuit could connect to an optional
backup battery and/or rechargeable backup battery
with charger. These options are shown as blocks
15 115 and 117 in Figure 1.

Figure 4 shows the same device with side 221

facing the viewer, with top 201 to the right and
bottom 223 to the left. In this view, device 100
shows a continuous listening "cl" button 225, a
"train" button 227, a "recognize" button 229 and
a "reset" button 231.

The following is a sample of instructions
which may be used in initialization of a speech
recognition module of a present invention device:

Quick Start Guide

1. Set the sound to the "SPEAKER ONLY"
position (up).
2. Turn power switch on (ON = 1, Off = 0).

I. PROGRAMMING:

1. First you will need to teach the unit a
word that will prompt it to listen for

a command or preset dial word. This word lets the unit know that you want to give a command or preset dial word to operate the phone. Press the CL button. The unit will prompt:

5

"Say word one".

You must now say the word that you wish to use as the prompting word.

Prompt Word: _____.

10

The unit will now prompt:

"Repeat!"

You must now repeat your chosen prompt word.

If the unit accepts the prompt word, it will say:

15

"Accepted!"

If the word is spoken differently in
the two versions, the unit will say:

"Error!"

If this occurs, you will need to start
over. The unit may prompt you to
repeat the word again, but if the unit
is silent, start over.

If you speak too quickly after the unit
prompts you, the unit will say:

"Spoke To Soon!"

The unit will then prompt you to repeat
the word.

If the word you used sounds similar to
a previous word, the unit will say:

"Similar to word...."

You must then start this word over,

using a different word.

When your word is accepted proceed to
step 2.

5

2. Now you will teach the unit the command words. The first four words command phone functions such as redial.

- a. Press the TRAIN button. The unit will prompt:

10

"Say word one"

You must now say the word that you wish to use to pickup and hang up the phone (Speakerphone Word).

Command Word 1: _____

15

The unit will now prompt:

"Repeat!"

You must now repeat your chosen word.

- b. Press the TRAIN button. The unit will prompt:

5 "Say word two!"

You must now say the word that you wish to use to redial the last number used (Redial Word)

Command Word 2: _____

10 The unit will now prompt:

"Repeat!"

You must now repeat your chosen word.

- c. Press the TRAIN button. The unit will prompt:

15

"Say word Three!"

You must now say the word that you
wish to use to mute the phone
(Mute Word).

Command Word 3: _____

5

The unit will now prompt:

"Repeat!"

You must now repeat your chosen
word.

d. Press the TRAIN button. The unit
will prompt:

10

"Say word four"

You must now say the word that you
wish to use to flash the phone
(Flash Word - used in call waiting

15

to switch to the other line).

Command Word 4: _____

The unit will now prompt:

"Repeat!"

You must now repeat your chosen
word.

5

If the unit accepts the prompt
word, it will say:

"Accepted!"

10

If the word is spoken differently
in the two versions, the unit will
say:

"Error!"

15

If this occurs, you will need to
start over. The unit may prompt
you to repeat the word again, but
if the unit is silent, start over.
If you speak too quickly after the

unit prompts you, the unit will
say:

"Spoke Too Soon!"

The unit will then prompt you to
repeat the word.

If the word you used sounds
similar to a previous word, the
unit will say:

"Similar To Word!"

You must then start this word
over, using a different word.

YOU HAVE NOW PROGRAMMED THE
COMMAND WORDS!

3. Next, you must program the preset dial
words.

The next ten words are the commands for

the dial memory buttons on the phone.

- a. Press the TRAIN button. the unit
will prompt:

"Say word five"

5

You must now say the word that you
wish to use to dial the first
preset on the phone.

Dial Word 5: _____

The unit will now prompt:

10

"Repeat!"

You must now repeat your chosen
word.

If the unit accepts the prompt
word, it will say:

15

"Accepted!"

If the word is spoken differently

in the two versions, the unit will
say:

"Error!"

5

If this occurs, you will need to
start over. The unit may prompt
you to repeat the word again, but
if the unit is silent, start over.
If you speak too quickly after the
unit prompts you, the unit will
say:

10

"Spoke too soon!"

The unit will then prompt you to
repeat the word.

15

If the word you used sounds
similar to a previous word, the
unit will say:

"Similar to word....."

You must then start this word
over, using a different word.

5

REPEAT STEP "A" FOR THE NEXT 9 PRESET NUMBERS

1. Party:_____ Number:_____ Word:_____

2. Party:_____ Number:_____ Word:_____

3. Party:_____ Number:_____ Word:_____

4. Party:_____ Number:_____ Word:_____

10

5. Party:_____ Number:_____ Word:_____

6. Party:_____ Number:_____ Word:_____

7. Party:_____ Number:_____ Word:_____

8. Party:_____ Number:_____ Word:_____

9. Party:_____ Number:_____ Word:_____

15

10. Party:_____ Number:_____ Word:_____

You now have successfully completed

programming your unit.

II. OPERATING PROCEDURE:

1. PLACE THE UNIT IN CONTINUOUS LISTENING
MODE.

5

To put the unit into listening mode

press the "Recognize" button. the

"Continuous Listening Mode" light will

turn on.

10

NOTE: If the intended user can not see the

"Continuous Listening on" light which will

blink on word recognition, place the sound

switch in the "Speaker and Buzzer" position

(downward). This will enable the user to

hear when the unit recognizes the initial

15

prompt word as well as any command or dial

preset word.

2. TO PICKUP AN INCOMING CALL:

- a. Clearly say the prompting word
programmed in section I.,1.

PROMPT WORD: _____

5

- b. The unit will produce a short beep if
the word is recognized (AND ONLY IF THE
SOUND SWITCH IS IN "SPEAKER AND BUZZER
MODE") If no beep is heard, try saying
the word again after a short pause to
let the unit reset.

10

- c. After the unit beeps, pause and say the
word that activates the speakerphone.

SPEAKERPHONE WORD: _____

15

- d. You have now picked up the incoming
call.
- e. To hang up, follow steps 2a. through

2c.

3. TO PLACE A CALL:

f. Follow steps 2a. through 2c. to produce
a dial tone.

5

g. Clearly say the prompting word
programmed in section I.,1.

PROMPT WORD: _____

h. After the unit beeps, pause and say the
word that activates the dial preset

10

that has the number you want to dial.

1. Party: _____ Number: _____ Word: _____

2. Party: _____ Number: _____ Word: _____

3. Party: _____ Number: _____ Word: _____

4. Party: _____ Number: _____ Word: _____

15

5. Party: _____ Number: _____ Word: _____

6. Party: _____ Number: _____ Word: _____

7. Party:_____ Number:_____ Word:_____

8. Party:_____ Number:_____ Word:_____

9. Party:_____ Number:_____ Word:_____

10. Party:_____ Number:_____ Word:_____

5

4. TO REDIAL A NUMBER:

a. Follow steps 2a. through 2c. to
produce a dial tone.

b. Clearly say the prompting word
programmed in section I.,1.

10

c. After the unit beeps, pause and
say the word that activates the
redial.

REDIAL WORD:_____

5. TO MUTE THE PHONE

15

While the phone is in operation:

a. Clearly say the prompting word

programmed in section I.,1.

PROMPT WORD:_____

- b. After the unit beeps, pause and
say the word that activates the
mute.

5

MUTE WORD: _____

6. TO FLASH THE PHONE:

While the phone is in operation:

- a. Clearly say the prompting word
programmed in section I.,1.

10

PROMPT WORD:_____

- b. After the unit beeps, pause and
say the word that activates the
flash.

15

FLASH WORD:_____

III. Supplementary Functions

Memory Erase

1. To completely erase the memory, press
the TRAIN and RECOGNIZE buttons
simultaneously for 5 seconds.
5
2. After the buttons are released, the
unit will prompt "Memory Erased".
3. The memory is now erased, and
reprogramming will require following
section I in the quick start guide.
10

Reset

1. The unit can be reset by pressing the
reset button.
2. This command clears any active function
and allows the user to start over in
case of an error.
15

Battery Backup

1. The unit comes complete with a battery backup to
5 allow the user to operate the phone when the
power goes out.
2. To conserve battery life:
 - a. Make sure that the unit is always plugged
in when operating.
 - 10 b. Make sure that the power switch is off
when storing unit.
3. The battery will last approximately 24 hours
during a power outage.

15 As can be seen from the foregoing disclosure, the present
invention is a speech activated, speech operated, device for attachment to
an existing landline telephone which has a one touch dialing feature, for
hands-free activation and dialing. It includes: (a) a main housing,
containing:

20 a telephone control circuit for analog input to a telephone to
induce dialing of a telephone number which has been stored in a one
touch dialing feature of the telephone;

an encoder circuit connected to the telephone control circuit for sending signals thereto and connected to a speech recognition module for receiving signals therefrom;

5 a speech recognition module connected to the encoder circuit and to a microphone and speaker for receiving speech inputs and transmitting audio information outputs, respectively, the speech recognition module having a speech recognition capability for hands free activation of the system, and having a speech recognition capability for hands free operation of the system.

10 It also includes: (b) a power source connection connected to at least one of the telephone control circuit, the encoder circuit and the speech recognition module for powering the device; and, (c) telephone connecting means connected to the telephone control circuit for connection to a telephone;

15 wherein a first user not requiring speech activated, speech operated functionality may assist in training the system by combination manual and speech operation to recognize a start word and other key words to access phone numbers stored in a landline telephone for subsequent access and for key word inputs for subsequent activation of
20 various functions, and a second user requiring total hands free speech activated and speech operated may utilize the system touch free for both activated and operated thereof.

The preferred present invention device telephone connecting means includes speech activated connections for a plurality of one touch dialing buttons of a landline telephone having a once touch dialing feature. In some embodiments, the telephone connecting means also
5 includes speech activated connections for a plurality of button-activated features different from one touch dialing, for voice activated initiation of said button-activated features. The present invention preferred device of further includes a training button for initiating said training instructions.

Obviously, numerous modifications and variations of the present
10 invention are possible in light of the above teachings. It is therefore understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.